

Appl. No. 10/706,323
Amdt. Dated March 2, 2006
Reply to Office Action of November 2, 2005

Attorney Docket No. 81863.0023
Customer No.: 26021

Amendments to the Drawings:

The attached sheet of drawings includes changes to Fig. 7-10. In Figures 7(a), 7(b), 8(a)-8(c), 9(a)-9(c), and 10(a)-10(c), previously omitted element "Prior Art" has been ADDED.

Attachment: Replacement Sheets for Figs 7(a) – 10(c)
Annotated Sheet Showing Changes for Figs 7(a) – 10(c)

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REMARKS/ARGUMENTS

This application has been carefully reviewed in light of the Office Action dated October 13, 2004. Claims 6-13 are canceled without prejudice. Claim 1 is amended. Claim 1 is the independent claim. Claims 1-5 are pending in the application. Reexamination and reconsideration of the application are respectfully requested.

DRAWING OBJECTION

Figures 7, 8, 9, and 10 were objected to for missing “prior art” designation. In response, Applicant has amended the figures to include “prior art” designation, and is submitting the amended figures with the current submission. Reconsideration and withdrawal of the above objection are respectfully requested.

CLAIM REJECTION UNDER 35 U.S.C. § 103

Claims 1, 2, 4, and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Miyata (U.S. Patent No. 6, 109, 738) in view of Yamauchi (U.S. Patent No. 6,568,797). Claim 3 stands rejected under § 103(a) as been unpatentable over Miyata in view of Yamauchi as applied to claim 1, and further in view of Chung (U.S. Pub. No. 2003/0112300 A1). Applicant respectfully traverse the rejections herein.

The present invention is directed to an ink recording head structure. The amended independent claim 1 is recited below:

“An ink jet recording head structure
comprising:
an ink jet recording head comprising a flow
passage member provided with a plurality of ink

chambers and pressurizing mechanisms for pressurizing ink in respective ink chambers, and a nozzle plate having ink discharge holes communicating with said ink chambers; and

 a support member comprising ceramics that has ink delivery holes communicating with the ink chambers of said flow passage member and supports said ink jet recording head,

 wherein said ink delivery hole has an elongated hole having an inclined bottom surface that opens on the ink jet recording head side and deepens toward the center, and a small-diameter hole that communicates with said elongated hole, and

 surface roughness of at least the inclined bottom surface of said ink delivery hole is from 0.4 to 1.0 μm in terms of arithmetic mean roughness (Ra) and void ratio is in a range from 5 to 30%.”

The applied reference does not disclose or suggest the above features of the present invention as defined by amended independent Claim 1. In particular, Miyata does not disclose or suggest, “said ink delivery hole has an elongated hole having an inclined bottom surface that opens on the ink jet recording head side and deepens toward the center, and a small-diameter hole that communicates with said elongated hole,” as required by amended independent Claim 1.

The amended independent claim 1 requires the delivery hole to include an elongated hole. The elongated hole has an inclined bottom surface. Miyata does not teach or suggest at least this feature.

The applied Miyata reference is directed to an ink jet print head having a plurality of piezoelectric vibrator. The Office Action asserts that Miyata includes a flow passage member (10) having a plurality of ink chambers (12). A support member (20) has an ink delivery hole communicating with the ink chambers. The delivery hole includes an elongated hole (31) having an inclined bottom surface (edges of ink chamber 12). (*See, Office Action; Page 3, lines 3-12; Miyata, Fig. 2b*).

Applicant notes that Miyata discloses a ink chamber (12) having an inclined bottom surface(edges of ink chamber 12). The elongated hole (31) does not have the inclined bottom surface as required by amended independent claim 1. Miyata thus fail to teach the features of amended independent claim 1.

The ancillary references are not seen to remedy Miyata's deficiency regarding amended independent claim 1. Accordingly, the applied references do not teach or suggest the above features of the present invention as recited in the amended independent Claim 1,

Moreover, Applicant respectfully submits that the applied reference do not disclose or suggest, "surface roughness of at least the inclined bottom surface of said ink delivery hole is from 0.4 to 1.0 μm in terms of arithmetic mean roughness (Ra) and void ratio is in a range from 5 to 30%," as recited in amended independent claim 1.

The Office Action notes Miyata does not teach or suggest the above feature, and cites portions of Yamaguchi to remedy that deficiency. (*See, Office Action; Page 3, 2nd Para. – Page 4, line 2*)

Applicant notes the cited portions of Yamauchi (Col. 9, lines 43-48 and Col. 11, lines 46-50), is directed to a printed circuit board (22), and not the bottom surface of the ink delivery hole as required by amended independent claim 1. (See, *Yamauchi; Col. 9, lines 20 – 42*).

According to Yamauchi, the printed circuit board (22) has piezoelectric elements (20 and 21) bounded thereon, which is the factor in the surface roughness requirement of the printed circuit board (22). (*Id.*). The printed circuit board (22) is not seen to be subject to ink flow.

In contrast, amended independent claim 1 requires the surface of the inclined bottom surface of the ink delivery hole has a roughness of 0.4 to 1.0 μm in terms of arithmetic mean roughness (Ra) and void ratio of 5 to 30%, which improves the wettability and flowability of that surface.

Accordingly, the cited roughness of Yamauchi is directed to the surface of different element, for a different purpose. Applicant thus respectfully submits that the cited teaching of Yamauchi cannot be combined with Miyata to obtain the features of the present invention.

Since the applied references fail to disclose, teach or suggest the above features recited in amended independent claim 1, the references cannot be said to anticipate or render obvious the invention which is the subject matter of that claim.

Accordingly, amended independent claim 1 is believed to be in condition for allowance and such allowance is respectfully requested.

Claims 2, 4, and 5 depend directly from amended independent claim 1, and are therefore also believed to be in condition for allowance.

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With regard to claim 3, Chung is not seen to remedy the deficiencies of Miyata and Yamauchi discussed above. Accordingly, Applicant respectfully submits that claim 3 depends from amended independent claim 1, and is allowable for at least the same reasons as those discussed above for amended independent claim 1.

COMCLUSION

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

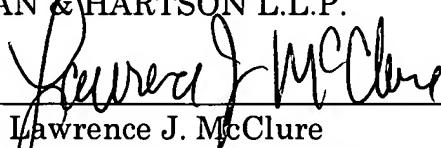
If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6810 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,

HOGAN & HARTSON L.L.P.

Date: March 2, 2006

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FIG.7(a) *Prior Art* - ADDED

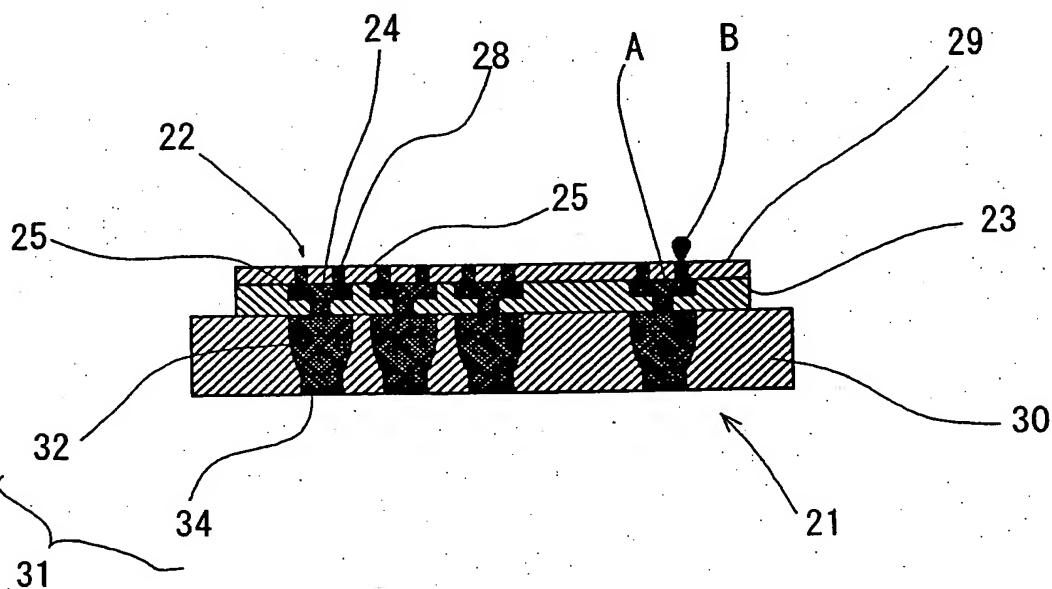


FIG.7(b) *Prior Art* - ADDED

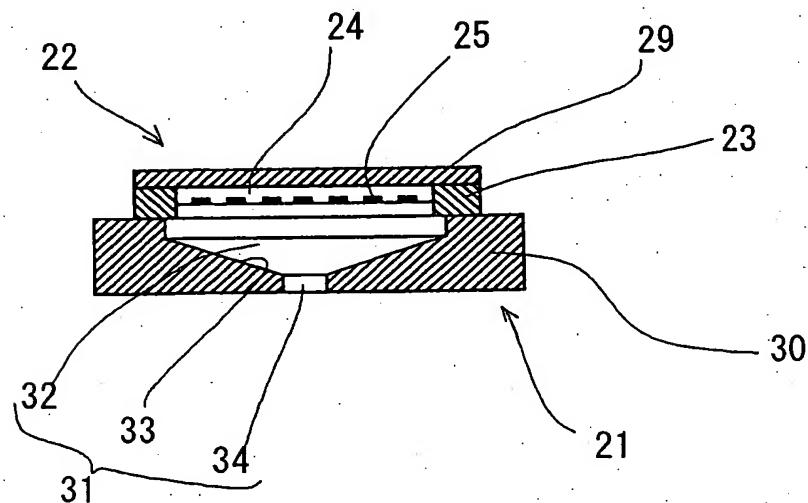


FIG.8(a)

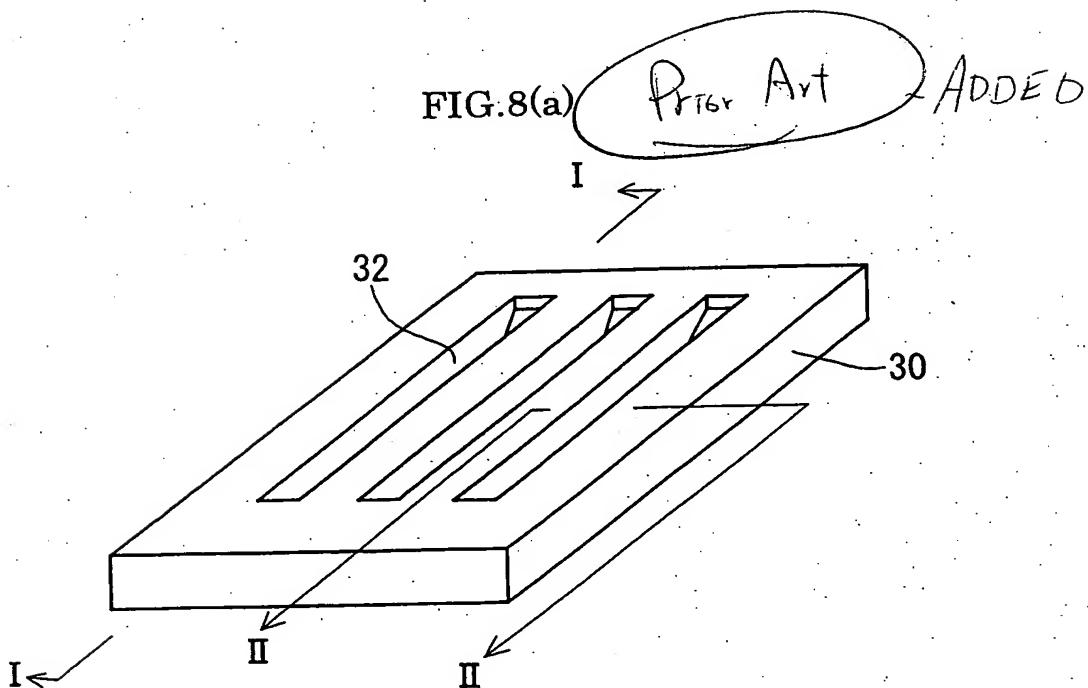


FIG.8(b)

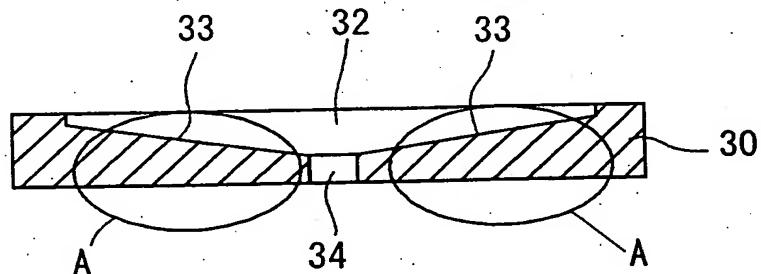


FIG.8(c)

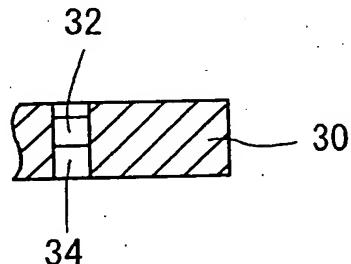


FIG.9 Prior Art - ADDED

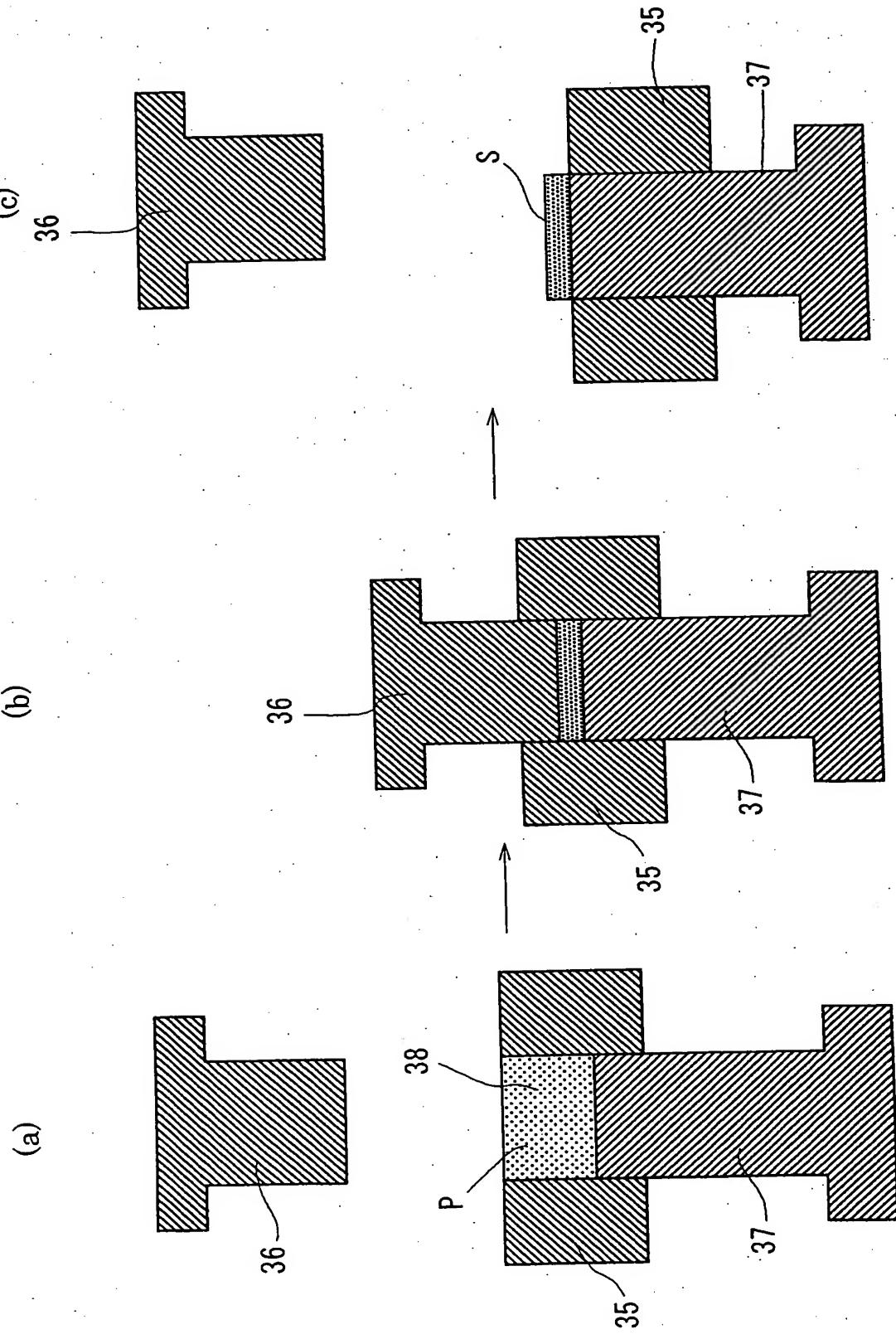


FIG.10 *Pr or Art ADDED*

